KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS
AS 251: Mathematics of Financial Derivatives
Term 232 – Spring 2024

Instructor: Dr. Kroumi Dhaker
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Office Hours: UTR 1:00 PM – 2:00 PM or by appointment
Time: UT 10:00 AM – 11:00 AM, R 8:00 AM – 10:00 AM
Place: Building 6: Room 105 UT & Room 106 R

Prerequisite: AS201 & STAT214
Credit Hours: (2-2-3)

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1. **Course Syllabus**: Posted on Blackboard.
2. **Textbook**: Robert L. McDonald. (2013). Derivatives Markets 3rd Edition. Pearson.
3. **Notes**: Class Notes.
4. **Calculator**: Texas BA II Plus Calculator or Texas BA II Professional.
5. **Lab Manual**: Selected chapters from Simon Benninga, Financial Modelling.
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Course Description:
Introductory Derivatives: Forwards and Futures. Options and Related Strategies. European put and call options. Put-call parity. Arbitrage opportunities. Rational valuation of derivative securities. Binomial tree and Black-Scholes Pricing Models. Actuarial Applications of Options Embedded in Insurance Products. Risk Management and Hedging. Spreadsheet programming software.

Grading Policy:

	Date	Time	Place	Materials	Percentage
Exam I	TBA	TBA	TBA	TBA	20%
Exam II	TBA	TBA	TBA	TBA	20%
Final Exam	TBA	TBA	TBA	TBA	35%
Attendance + Class participation					10%
Class Work	It is based on quizzes, class tests or other class activities determined by the instructor.				15%

Communication:
- For regular announcements, students are advised to check Blackboard regularly.

- Students are required to carry **pens, note-taking equipment and a calculator to EVERY lecture, quizzes, and exams**. It is strongly recommended to keep a **binder** for class-notes.
- Students are also expected to take class notes and organize their learning material in a binder for easy retrieval to help them in study and review for class, exams, etc.
- It is to the student's advantage to keep a binder for storing class notes, homework, and other graded assignments.
  - Students who are organized will find it easier to find important materials when studying for exams.
- To successfully learn financial mathematics, students MUST ==solve problems== and ==analyze data==. The selected assigned problems are specifically designed to prepare you for class quizzes, lab, majors and final exam. So, it is expected that you complete these problems ==step-by-step== and ==with comprehension.== If you happen to stumble upon a solution manual somewhere, remember 2 important points. (1) these solutions are brief and may have mistakes and (2) you are expected in your career as an actuary and your exams and quizzes in this class to know every step to a problem and to know when a solution is incorrect. Thus, the best way to solve problem is without these brief solutions
- Never round your intermediate results to problems when doing your calculations. This will cause you to lose calculation accuracy. Round only your final answers and you should not round less than 4 decimal places unless required otherwise.
- For every exam, so you need to bring with you pens, pencils, a sharpener, an eraser, and a calculator

Academic Integrity: All KFUPM policies regarding ethics and academic honesty apply to this course.

Important Attendance Notes:
- In accordance with University rules, **9 (NINE) unexcused absences** or **12 (TWELVE) excused-unexcused absences** will automatically result in a grade of **DN**.
- Attendance on time is very important. Mostly, attendance will be checked within the first five minutes of the class. Entering the class after that, is considered as one late, and every two times late equals to one absence. The student has to be available until the end of the class.

Cheating in Exams:
Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a grade of **DN** in the course along with reporting the incident to the higher university administration. Cheating in exams includes (but is not limited to)
- Looking at the papers of other students
- Talking to other students
- Using mobiles or any other electronic devices **including Smart Watch**

Missing an Exam: No makeup exam will be given under any circumstance. If a student misses Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the existing formula, which depends on his performance in the non-missed exam and in the final exam. It is to the professor's discretion whether to accept or refuse the student's excuse for missing an exam.

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must take permission from their instructor. Violations of these rules will result in a penalty decided by the instructor.

Grading:

Your course grade will be based on the total of points accumulated on class work two major exams, and Final Exam. The following scale gives the cut-off points for the course grades.

Letter grade	A+	A	B+	B	C+	C	D+	D	F	DN
Cut-off	90%	85%	80%	75%	67%	60%	55%	50%	<50%	≥ 9

Syllabus – A rough weekly guideline

Week #	Section	Topics
1	1.1, 1.2, 1.4	Introduction to derivatives
2	1.5 2.1, 2.2	Introduction to derivatives (cont.) An introduction to Forwards and Options
3	2.3, 2.4 3.1, 3.2	An introduction to Forwards and Options (cont.) Insurance, Collars, and Other Strategies
4	3.3, 3.4 4.1	Insurance, Collars, and Other Strategies (cont.) Introduction to Risk Management
5	5.1, 5.2, 5.3	Financial Forwards and Futures
6	9.1, 9.3	Parity and Other Options Relationships
7	10.1, 10.2, 10.3	Binomial Option Pricing: Basic Concepts
8	10.4, 10.5, 10.6	Binomial Option Pricing: Basic Concepts (cont.)
9	11.1 12.1, 12.2	Binomial Option Pricing: Selected Topics The Black-Scholes Formula
10	12.3 Appendices A, B	The Black-Scholes Formula (cont.)
11	13.1, 13.2, 13.3	Market-Making and Delta-Hedging
12	13.4, 13.5, 13.6	Market-Making and Delta-Hedging (cont.)
13	14.1, 14.2, 14.3	Exotic Options: I
14	14.3, 14.4, 14.5	Exotic Options: I (cont.)
15	18.1, 18.2, 18.3, 18.4	The Lognormal Distribution